DOCUMENT RESUME

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ABSTRACT

Instructional materials are provided for nine courses in an aircraft electronics maintenance training program. Courses are as follows: aviation basic electricity, direct current and alternating current electronics, basic avionic installations, analog electronics, digital electronics, microcomputer electronics, radio communications, aircraft electromechanical components and control systems, and Federal Communications Commission license preparation. A cover sheet for each course presents this information: course number; course title; co- or pre-requisite; availability of test out; course description; hours of instruction, including classroom and lab hours per week and length of course in weeks; and name of preparers and date of preparation. A second sheet lists the textbook used, including title, author, edition, publisher, and copyright; a list of references; a list of audiovisual aids; and a list of equipment and supplies. A course outline provides a content outline and learning activities for each competency statement. A course consists of from 2 to 62 competencies. (YLB)

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ED340938

AIRCRAFT ELECTRONICS MAINTENANCE TRAINING SIMULATOR

CURRICULUM OUTLINES

Blackhawk Technical College

Janesville, WI

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
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BLACKHAWK
TECHNICAL COLLEGE
6004 Prairie Road
Janesville, Wisconsin 53547
Telephone: (608) 756-4121

Serving Rock and Green Counties

COURSE NUMBER 414-331

COURSE TITLE: Aviation Basic Electricity

DIVISION: INDUSTRIAL OCCUPATIONS

PROGRAM ASSIGNMENT: AVIONICS

COREQUISITE:

TEST OUT AVAILABLE :

COURSE DESCRIPTION:
The fundamental theories of electricity and electronics in this course combined with classroom discussion, lectures, demonstrations and practical application should assist the student in attaining the proficiency levels defined in current federal aviation regulations concerning the certification of aviation maintenance technicians. The teaching levels of this study are in accordance with FAR Part 147 Appendix A, Levels One, Two and Three.

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Total potential hours of instruction	90
Classroom hours/week	2
Lab hours/week	3
Shop hours/week	—
Clinical or occupational hours/week	—
Field experience hours/week	—
Total student hours/week	5
Length of course (weeks)	18

AID CODE: 32

MATERIAL CODE: 3 STATE APPROVAL DATE :

ORIGINAL PREPARED BY:
Bill Stevens, Avionics Instructor
Gene Hilst, Electronics Instructor
Sheila Jones, Curriculum Typist

DATE: April, 1990

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BLACKHAWK
TECHNICAL COLLEGE
6004 Prairie Road
Janesville, Wisconsin 53547
Telephone: (608) 756-4121

COURSE NUMBER 414-331

COURSE TITLE : Aviation Basic Electricity

TEXTS:
TITLE Aircraft Electricity & Electronics EDITION Fourth

AUTHOR Eismin/Bent/McKinley PUBLISHER McGraw-Hill COPYRIGHT 1989

REFERENCES: Electronic Communication - Robert L. Shrader
AC 43.13-1A-2A, AC 65-9A Airframe & Powerplant Mechanics General Handbook
AC 65-15A Airframe & Powerplant Mechanics Airframe Handbook.

AUDIO-VISUAL AIDS:

EQUIPMENT AND SUPPLIES: Electronic lab equipment, repair station QN2R115L, Selected aircraft

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will relate electricity to the nature of matter and identify electrical sources.	1.1 Atoms and their structure 1.2 Static electricity 1.3 Direction of current flow (FAA)	Reading Assignment Lecture - Demonstration A/V Presentation Test

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will define the electrical properties of a circuit	Electrical Characteristics: Voltage Current Resistance Power Energy	Reading Assignment Lecture- Demonstration A/V Presentation Test

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will define magnetic properties of circuits & devices	4.1 Magnetic circuit terms 4.2 Magnetic field storage and energy	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will set up and operate electromagnetic devices	Electromagnets Solenoids Relays Left hand rule for coils	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will list methods of producing voltage	Piezoelectricity Thermocouple Electromagnetic induction	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will demonstrate the left hand rule for generators	Principles of electromagnetic induction	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will apply Ohm's Law	Ohm's Law $I = \frac{E}{R}$	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will solve power and work problems	Power = EI	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will draw a single wire aircraft electrical circuit using an airframe return path	Types of electrical circuits	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will construct series circuit	Series circuit laws	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will troubleshoot series circuits in the lab and in aircraft	Series circuit analysis and calculations	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will apply series-parallel rules in analyzing aircraft wiring diagrams	Aircraft manufacturer wiring diagrams	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will state and apply Kirchhoff's Laws	Kirchhoff's Laws for series and parallel circuits	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will solve a resistance bridge circuit	Delta Y conversion for bridge circuits	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will apply Ohm's Law to practical aircraft problems	Electrical considerations in aircraft electrical power systems	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify the different types of batteries	Primary cells and secondary cells	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will select the correct type of battery for a specific application	Battery applications	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will state specific considerations of aircraft battery installation and inspection procedures	Installation of aircraft batteries	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will measure and evaluate battery performance and connection parameters	Battery operation and maintenance procedures	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify properties of nickel-cadmium storage batteries	Aircraft nickel-cadmium batteries	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will state procedures used during charging and deep cycle of aircraft nickel-cadmium batteries	Charging nickel-cadmium batteries	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab Deep cycle and charge a nickel-cadmium battery using aircraft nickel-cadmium battery charging stand on the hangar floor

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will list nickel-cadmium battery handling safety procedures for aircraft nickel-cadmium batteries	Precautions for handling nickel-cadmium batteries	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will use correct tools, equipment and procedures for maintenance of lead-acid aircraft batteries	Battery maintenance tools and equipment	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify characteristics and specifications of wire used in aircraft	Aircraft electrical wire	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will select aircraft electrical wire for various applications using FAA specifications and FAA tables and charts	FAA tables and charts as found in FAA publications such as 43.13 1A/3 and 43.13-2A	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aircraft Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will lace and clamp, tie, and route aircraft wire bundles according to FAA specifications	FAA AC 43.13-1A Chapter 11 Section 7	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will list aircraft wire marking methods and identify common codes used in aircraft wire marking	FAA AC 43.13-1A Chapter 11 Section 4	Identify wires in aircraft found in our hangar Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-331

COURSE TITLE Aviation Basic Electricity

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will select and connect various aircraft wire and cable terminals in accordance with FAA specifications	FAA AC 43.13-1A Chapter 11 Section 5	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

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TECHNICAL COLLEGE
6004 Prairie Road
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Telephone: (608) 756-4121

Serving Rock and Green Counties

COURSE NUMBER 414-332

COURSE TITLE: DC and AC Electronics

DIVISION: INDUSTRIAL OCCUPATIONS

PROGRAM ASSIGNMENT:

COREQUISITE: High School Algebra and Test

TEST OUT AVAILABLE :

COURSE DESCRIPTION:

This course introduces the fundamentals of electricity. Emphasis is placed on understanding the laws of electricity as they relate to calculations and measurements of DC and AC voltage, current, resistance, and impedance in series, parallel and combination circuits. Capacitive and inductive reactance as well as transformer action are covered. Basic subjects of safety, metric notation, and equipment use are all part of this term.

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Total potential hours of instruction	90
Classroom hours/week	2
Lab hours/week	3
Shop hours/week	—
Clinical or occupational hours/week	—
Field experience hours/week	—
Total student hours/week	5
Length of course (weeks)	18

AID CODE: 32

MATERIAL CODE: 3 STATE APPROVAL DATE :

ORIGINAL PREPARED BY:
Bill Stevens, Avionics Instructor
Gene Hilst, Electronics Instructor
Sheila Jones, Curriculum Typist

DATE: April, 1990

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BLACKHAWK
TECHNICAL COLLEGE
6004 Prairie Road
Janesville, Wisconsin 53547
Telephone: (608) 756-4121

COURSE NUMBER

COURSE TITLE : DC and AC Electronics

TEXTS:
TITLE Electronic Communications EDITION Fifth

AUTHOR Robert Shrader PUBLISHER McGraw-Hill COPYRIGHT 1985

REFERENCES: Aircraft Electricity and Electronics - Eisman/Bent/McKinley
AC 43.13-1A-2A AC65-9A Airframe & Powerplant Mechanics General Handbook
AC65-15A Airframe & Powerplant Mechanics Airframe Handbook

AUDIO-VISUAL AIDS: See attached list

EQUIPMENT AND SUPPLIES: Electronic lab equipment, repair station QN2R115L, power supplies, DMM, Function generator, Impedance bridge, Oscilloscope, DeVry board frequency counters, selected aircraft.

468v	An Introduction to Alternating Current	30 Min
469v	AC and the Sine Wave	29
470v	Oscilloscope and It's Use	29
471v	Sine Wave and Phase	30
472v	Resistive Circuits	30
473v	Capacitance	29
474v	RC Circuit Analysis	30
475v	Inductance and Transformers	29
476v	RL Circuit Analysis	31
477v	RC and RL Time constants	29
478v	RLC Circuit Analysis	23
479v	Phasor Algebra	29
480v	Complex RLC circuit analysis	28
481v	Resonance	29
116v	Filters -A	
117v	Filters -B	

LAB

483v	Oscilloscope Calibration and Use	18
484v	Oscilloscope Input Coupling & Waveform Anal.	25
485v	Oscilloscope Triggering	14
486v	Resistive Circuits	18
487v	Series RC Circuits	18
488v	Parallel RC Circuits	17
489v	Transformers	12
490v	Series RL Circuits	13
491v	Parallel RL Circuits	10
492v	RC Time Constants	15
493v	RL Time Constants	14
494v	Series Resistive and Reactive Circuits	15
495v	Parallel Resistive and Reactive Circuits	14
496v	Resonance	12
497v	Introduction to Safety in the Lab	24

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Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will relate electricity to the nature of matter and identify electrical sources.	1.1 Atoms and their structure 1.2 Static Electricity	Reading Assignment Lecture - Demonstration A/V Presentation Test

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will define the electrical properties of a circuit	Electrical Characteristics voltage current resistance power energy	Reading Assignment Lecture - Demonstration A/V Presentation Test

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will compute and measure resistance of conductors and insulators	Resistance material area length temperature	Reading Assignment Lecture - demonstration A/V Presentation Test

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will apply Ohm's Law	Ohm's Law $I = \frac{E}{R}$	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will analyze series circuits	Series circuit rules	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will solve series circuit problems	Equivalent circuits and resistance voltage drops	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will construct series circuit	Series circuit laws	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will solve parallel circuit problems	Parallel circuit laws	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will analyze, construct, and troubleshoot parallel circuits	Parallel circuit analysis and calculations Differences between series and parallel circuits	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will solve series-parallel and parallel-series problems	Application of circuits reduction techniques and Ohm's law	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will analyze, construct, and troubleshoot series-parallel and parallel-series circuits	Single supply series-parallel circuits Practical circuit methods Circuit schematic analysis	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify properties of an AC signal	Characteristics of a sine wave AC sources	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify AC sources	AC generation sources	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will analyze and measure AC signals using oscilloscope, frequency meters and generators	Equipment operating instruction Test set-ups Types of measurements Reading of measurements	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will set up and operate in an AC circuit VOM, DMM, power supplies, oscilloscope, frequency counter, signal generator, impedance bridge, and wattmeters.		Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will analyze, construct, and troubleshoot AC capacitive circuits and solve reactive problems	Impedance characteristics Impedance diagrams Calculation of impedance phase Voltage and current reactances Complex numbers	Reading Assignment Lecture --Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will analyze, construct, and troubleshoot AC inductive circuits and solve reactive problems	Impedance characteristics Impedance diagrams Calculation of impedance phase Voltage and current reactances Complex numbers	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will solve capacitive and inductive problems	Phasor diagrams J operator Polar and rectangular notation	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will troubleshoot aircraft capacitive and inductive circuits	Aircraft system diagrams	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will list advantages of AC power in aircraft	Aircraft electrical systems	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will sketch delta and wye polyphase diagrams as used in aircraft alternators	Aircraft electrical systems	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will analyze and apply principles of transformers to AC circuits	Transformer principles and AC magnetism Transformer losses Types of transformers Loading effects	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will solve transformer voltage, power, current, and impedance problems.	The use of complex numbers and trigonometry to solve AC circuit problems	Reading Assignment Lecture - Demonstration A/V Presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will analyze, construct, and troubleshoot series, parallel and complex RLC circuits	Equivalent circuits Conductance, susceptance, and admittance	Reading Assignment Lecture - Demonstration A/V presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will solve network theorems using Theunin and Norton	Principles of RLC circuits Rules of Theorems for solving AC circuit and network problems	Reading Assignment Lecture - demonstration A/V presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will analyze, construct and troubleshoot series and parallel resonant circuits and solve resonant circuit problems	Define resonance Calculate resonance Circuit parameters Methods of solving resonant circuit problems	Reading Assignment Lecture - demonstration A/V presentation Test Lab

Blackhawk
Technical College

COURSE NUMBER 414-332

COURSE TITLE DC and AC Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will analyze, construct, and troubleshoot filter circuits and solve filter circuit problems	Filter circuit principles Types of filters Calculate component values Measure filter performance	Reading assignment Lecture - Demonstration A/V presentation Test Lab

BLACKHAWK
TECHNICAL COLLEGE
6004 Prairie Road
Janesville, Wisconsin 53547
Telephone: (608) 756-4121

Serving Rock and Green Counties

COURSE NUMBER: 414-333

COURSE TITLE: BASIC AVIONIC INSTALLATIONS

PROGRAM ASSIGNMENT: AVIONICS

DIVISION: INDUSTRIAL OCCUPATIONS

PREREQUISITES: NONE

COURSE DESCRIPTION:

Upon completion of this course, the student will calculate and correct, if necessary, aircraft weight and balance altered by the installation of radio equipment. He/she will also design, construct, and install a sheetmetal rack to house designated aircraft radio equipment with all work performed in accordance with the Federal Aviation Regulations (FAR).

Total potential hours of instruction	—
Classroom hours/week	—
Lab hours/week	—
Shop hours/week	—
Clinical or occupational hours/week	—
Field experience hours/week	—
Total student hours/week	—
Length of course (weeks)	—

AID CODE: CREDIT VALUE: 3

MATERIAL CODE: STATE APPROVAL DATE:

ORIGINAL PREPARED BY:

FRANK KASHINSKI, Avionics Instructor and
DEBBIE COTTER, Curriculum Specialist

DATE: April, 1989

BLACKHAWK
TECHNICAL COLLEGE
6004 Prairie Road
Janesville, Wisconsin 53547
Telephone: (608) 756-4121

COURSE NUMBER 414-333

COURSE TITLE BASIC AVIONICS INSTALLATION PROCEDURES

TEXTS: NONE
TITLE __ EDITION __

AUTHOR __ PUBLISHER __ COPYRIGHT __

REFERENCES: FEDERAL AVIATION REGULATION # 43.13

AUDIO-VISUAL AIDS: BTC #1941; ITP-S-113, RIVET INSTALLATION
BTC #1950; 1TP-EA-BAL, AIRCRAFT WEIGHT & BALANCE
BTC #1943; ITP-S-120, THE VERNIER CALIPER
BTC #1942; ITP-S-119, THE MICROMETER CALIPER

EQUIPMENT AND SUPPLIES: CESSNA 150 AIRPLANE

Blackhawk
Technical College

Course Number 414-333

Course Title BASIC AVIONICS INSTALLATION PROCEDURES

Competency statement # 1	Content outline	Learning activities
The student will follow all prescribed procedures when working in the classroom/lab.	A. Identify safety procedures when working with: 1. air driven equipment. 2. electrical equipment. 3. metals and metal forming equipment. B. Identify safety gear worn when performing specified tasks. C. Identify First Aid procedures for specified injuries: 1. electrical shock. 2. cuts. 3. eye injuries.	Lecture Demonstrations Information Sheets

Blackhawk
Technical College

Course Number 414-333

Course Title BASIC AVIONICS INSTALLATION PROCEDURES

Competency Statement # 2	Content outline	Learning activities
Given a logbook on a Cessna 150, the student will calculate weight and balance when radio equipment is positioned at various locations in the aircraft with 100% accuracy.	A. Interpret weight and balance requirements of the aircraft. B. Identify the center of gravity (CG) of the aircraft. C. Perform basic mathematical functions.	Lecture Job Sheets Practice Exercises

Blackhawk
Technical College

Course Number 414-333

Course Title BASIC AVIONICS INSTALLATION PROCEDURES

Competency Statement # 3	Content outline	Learning activities
The student will bend aluminum sheetmetal to installation specifications stated in Federal Aviation Regulation (FAR) # 43.13.	A. Interpret FAR # 43.13. B. Interpret radio installation schematics. C. Measure sheetmetal. D. Use metal forming equipment.	FAR # 43.13 Information Sheets Demonstrations Job Sheets

Blackhawk
Technical College

Course Number 414-333

Course Title BASIC AVIONICS INSTALLATION PROCEDURES

Competency Statement # 4	Content outline	Learning activities
Given a practice board, the student will install all specified rivets and fasteners in the manner prescribed in FAR # 43.13 with an accuracy rate of 75%.	A. Interpret FAR # 43.13. B. Draw drill pattern. C. Select drill bits. D. Maintain/sharpen drill bits. E. Drill holes for the rivets/fasteners. F. Install rivets/fasteners.	FAR # 43.13 Information Sheets Demonstrations Job Sheets

Blackhawk
Technical College

Course Number 414-333

Course Title BASIC AVIONICS INSTALLATION PROCEDURES

Competency Statement # 5	Content outline	Learning activities
Using the standards stated in FAR # 43.13, the student will remove/replace unacceptable rivets.	A. Interpret FAR # 43.13. B. Identify the various types of rivets. C. Determine if rivets are acceptable. D. Remove unacceptable rivets. E. Select replacement rivets. F. Install replacement rivets.	FAR # 43.13 Information Sheets Demonstrations Job Sheets

Blackhawk
Technical College

Course Number 414-333

Course Title BASIC AVIONICS INSTALLATION PROCEDURES

Competency Statement # 6	Content outline	Learning activities
The student will build a radio rack to house specified radio equipment following the guidelines and procedures outlined in FAR # 43.13.	A. Interpret FAR # 43.13. B. Interpret radio installation blueprints. C. Draw layout of rivet installation. D. Bend aluminum sheetmetal to specifications. E. Drill precision holes. F. Install rivets. G. Inspect rivets. H. Remove unacceptable rivets. I. Reinstall rivets.	FAR # 43.13 Demonstrations Worksheets Job Sheets

Blackhawk
Technical College

Course Number 414-333

Course Title BASIC AVIONICS INSTALLATION PROCEDURES

Competency Statement # 7	Content outline	Learning activities
The student will install the radio rack into the control panel in compliance with the standards stated in FAR # 43.13.	A. Interpret FAR # 43.13. B. Interpret radio installation blue-prints. C. Form aluminum sheetmetal. D. Join aluminum sheetmetal. E. Drill rivet holes. F. Install rivets.	FAR # 43.13 Demonstrations Job Sheets

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Technical College

Course Number 414-333

Course Title BASIC AVIONICS INSTALLATION PROCEDURES

Competency Statement # 8	Content outline	Learning activities
Given the installation information for a specified radio, the student will select the wire size and bundling techniques to be use in the radio installation in compliance with FAR # 43.13.	A. Interpret the installation schematics locating: 1. indicator. 2. microphone. 3. speaker. 4. pin location. 5. transmitter. 6. receiver. 7. types of coax cable. B. Interpret wiring charts in FAR #43.13: 1. identify wire type. 2. identify wire size. C. Identify accepted wiring patterns. D. Identify accepted bundling techniques.	FAR # 43.13 Demonstrations Information Sheets

Blackhawk
Technical College

Course Number 414-333

Course Title BASIC AVIONICS INSTALLATION PROCEDURES

Competency Statement # 9	Content outline	Learning activities
The student will test all newly installed radio equipment to insure it meets manufacturers' specifications.	A. Compare/contrast the purpose of test equipment: 1. volt-ohm-milliam meter (VOM). 2. voltmeter. 3. spectrum analyzer. B. Interpret manufacturers equipment operation manuals. C. Select equipment for analyzing specified radio components. D. Interpret test results. E. Complete paperwork to instigate equipment repair at FAA Repair Station.	Information Sheets Checklists

BLACKHAWK
TECHNICAL COLLEGE
6004 Prairie Road
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Telephone: (608) 756-4121

Serving Rock and Green Counties

COURSE NUMBER 414-334

COURSE TITLE: Analog Electronics

DIVISION: INDUSTRIAL OCCUPATIONS

PROGRAM ASSIGNMENT: AVIONICS

COREQUISITE: 414-332

TEST OUT AVAILABLE : Yes

COURSE DESCRIPTION:

This course puts the fundamentals of electricity to work for analog circuits. Students calculate, measure and investigate the characteristics of the semiconductor diode, transistors, rectifiers, amplifiers, oscillators, and multivibrator circuits. The effects of component failure are also studied. Power supply circuits are utilized to consolidate the fundamentals of electricity and electronics into a functional circuit environment.

Total potential hours of instruction	90
Classroom hours/week	2
Lab hours/week	3
Shop hours/week	—
Clinical or occupational hours/week	—
Field experience hours/week	—
Total student hours/week	5
Length of course (weeks)	18

AID CODE: 32

MATERIAL CODE: 3 STATE APPROVAL DATE :

ORIGINAL PREPARED BY:

Gene Hilst, Electronics Instructor
Bill Stevens, Avionics Instructor

DATE: 5/90

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Telephone: (608) 756-4121

COURSE NUMBER 414-334

COURSE TITLE : Analog Electronics

TEXTS:
TITLE Introductory Electronic Devices & Circuits EDITION First

AUTHOR Paynter PUBLISHER Prentice-Hall COPYRIGHT 1989

REFERENCES: Electronic Communication, Fifth Edition
Shrader, McGraw-Hill, 1985

EQUIPMENT AND SUPPLIES: Passive/active components, proto board, power supply, DMM, function generator, transistor curve tracer, oscilloscope, frequency counter, isolation variac transformer

AUDIO-VISUAL AIDS: See attached list

109V	Complementary Symmetry (Amplifiers)	
793V	Practical Transistors	
1579V	Junction Transistor	
1371V	Linear Power Supplies	
968V	Low Frequency Amplifiers	
970V	Minority Carriers	
1655V	Mosfets	
710V	Multistage Amplifiers	
1370V	Operational Amplifiers	
971V	P-N Junction Fundamentals	
118V	Power Supplies & Filters - Troubleshooting	
794V	Practical Transistors	HP
785V	Practical Transistors	HP
786V	Practical Transistors	HP
692V	Practical Transistors	HP
518V	Practical Transistors	HP
1648V	Semiconductor Material	
1972V	Servicing Techniques	
1649V	Silicon Diodes	
1721V	Simple Troubleshooting Techniques	
1650V	Special Purpose Diodes	
1367V	Switching Power Supplies	
973V	Switching Techniques	
1656V	Thyristors	
114V	Transistor Push-pull Amplifiers	
975V	Transistor Tetropes & Field Effects Transistors	
391V	Transistor	
1249V	Transistors	Series
1248V	Transistors	Series
1247V	Transistors	Series
1246V	Transistors	Series
974V	Transistors in Pulse Applications	
976V	Triode Fundamentals (Transistors)	
1180V	Troubleshoot Transistors Faster	
720V	Troubleshooting Tips (Pract. Trans)	
1653V	J-FET Fundamentals	
1654V	J-FET Characteristics	
2303V	Silicon Controlled Rectifiers (SCR's)	
2304V	Regulated Power Supplies	

Blackhawk
Technical College

COURSE NUMBER 414-334

COURSE TITLE Analog Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
1. Student will state, recognize, and identify semiconductor principles, manufacturing techniques, diode operating principles and specifications.	Semiconductors A. Semiconductor principles B. Semiconductor diodes C. Diode and zener diode action and diode specifications D. Diode parameters and applications	Reading assignment Lecture Video tape presentation Lab experiments Group discussion Test
2. Student will identify the various types of diodes.		
3. Student will state the diode parameters using mathematical formulas.		
4. Student will demonstrate the operation of diode parameters by measuring voltages and currents and constructing characteristic curves using test circuits and test equipment.		

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Technical College

COURSE NUMBER 414-334

COURSE TITLE Analog Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
5. Student will identify the various types of power supply circuits from schematics.	Basic power supplies AC to DC converters A. Halfwave rectifier (HW) B. Fullwave rectifier(FWCT) C. Fullwave voltage doubler D. Fullwave bridge rectifier E. Dual polarity fullwave rectifier	Reading assignment Lecture Video tape presentation Lab experiments Group discussion Test
6. Student will demonstrate the operation and the application of power supply circuits		
7. Student will measure the parameters of power supply circuits using test equipment.		
8. Student will verify the operation of power supply circuits with given circuit parameters.		
9. Student will analyze and trouble-shoot their own lab circuits using test equipment.		

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COURSE NUMBER 414-334

COURSE TITLE Analog Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
10. Student will identify the various types of non linear waveshaping circuits from schematics. 11. Student will state the circuit parameters for non linear waveshaping circuits using mathematical formulas. 12. Student will demonstrate the operation and application of non linear waveshaping circuits 13 Student will measure the parameters of non linear wave-shaping circuits using test equipment. 14. Student will verify the operation of waveshaping circuits with given circuit parameters. 15. Student will analyze and trouble-shoot their own lab circuits using test equipment.	Non linear Waveshaping A. Clipper B. Clamper	Reading assignment Lecture Video tape presentation Lab experiments Group discussion Test

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Technical College

COURSE NUMBER 414-334

COURSE TITLE Analog Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
16. Student will identify the various types of transistor circuits from schematics. 17. Student will state the circuit parameters for transistor circuits using mathematical formulas. 18. Student will demonstrate the operation of transistor circuits. 19. Student will measure the parameters of transistor circuits using test equipment. 20. Student will verify the operation of selected transistor circuits with given circuit parameters. 21 Student will analyze and trouble-shoot their own lab circuits using test equipment.	Bipolar Junction Transistors A. Common emitter unbypassed. B. Common emitter fully bypassed. C. Common emitter split bypassed. D. Common Base E. Common Collector F. Voltage mode feedback G. Emitter bias H. Cascade amplifiers I. Multistage audio amplifiers J. Push-pull amplifiers.	Reading assignment Lecture Video tape presentation Lab experiments Group discussion Test

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Technical College

COURSE NUMBER 414-334

COURSE TITLE Analog Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
22. Student will identify the various types of transistor oscillators from schematics.	Transistor Oscillators A. Hartley oscillator B. Colpitts oscillator C. Armstrong oscillator D. RC phase shift oscillator E. Sawtooth oscillator	Reading assignment Lecture Video tape presentation Lab experiments Group discussion Test
23. Student will state the circuit parameters for transistor oscillators using mathematical formulas.		
24. Student will demonstrate the operation of transistor oscillators.		
25. Student will measure the parameters of transistor oscillators using test equipment.		
26. Student will verify the operation of selected transistor oscillators with given circuit parameters.		
27. Student will analyze and trouble-shoot their own lab circuits using test equipment.		

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COURSE NUMBER 414-334

COURSE TITLE Analog Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
28. Student will identify the various types of transistor pulse circuits from schematics. 29. Student will state the circuit parameters for transistor pulse circuits using mathematical formulas. 30. Student will demonstrate the operation of transistor pulse circuits. 31. Student will measure the parameters of transistor pulse circuits using test equipment. 32. Student will verify the operation of selected transistor pulse circuits with given circuit parameters. 33 Student will analyze and troubleshoot their own lab circuits using test equipment.	Transistor Pulse Circuits A. Astable multivibrator B. Bistable multivibrator C. Monostable multivibrator D. Squaring amplifier	Reading assignment Lecture Video tape presentation Lab experiments Group discussion Test

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Technical College

COURSE NUMBER 414-334

COURSE TITLE Analog Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
34. Student will identify the various types of FET transistor circuits from schematics. 35. Student will state the circuit parameters for FET transistor circuits using mathematical formulas. 36. Student will demonstrate the operation of FET transistor circuits. 37. Student will measure the parameters of FET transistor circuits using test equipment. 38. Student will verify the operation of selected transistor FET circuits with given circuit parameters. 39. Student will analyze and troubleshoot their own lab circuits using test equipment.	Field Effect Transistors A. Types of FET's B. Principles of operation C. Specifications and device parameters D. FET amplifiers E. FET oscillators	Reading assignment Lecture Video tape presentation Lab experiments Group discussion Test

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Technical College

COURSE NUMBER 414-334

COURSE TITLE Analog Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
40. Student will identify the various types of trigger devices from schematics. 41. Student will state the circuit parameters for thyristors and their use in troubleshooting circuits. 42. Student will demonstrate the operation of thyristor circuits. 43. Student will measure the parameters of thyristors using test equipment. 44. Student will verify the operation of selected thyristor circuits. 45. Student will analyze and trouble-shoot their own lab circuits using test equipment.	Thyristors and Trigger Devices and Circuits A. Unijunction transistor oscillators B. SCR principles of operation C. SCR trigger circuits D. Diac-triac circuits E. Thyristor power controls	Reading assignment Lecture Video tape presentation Lab experiments Group discussion Test

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COURSE NUMBER 414-334

COURSE TITLE Analog Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
46. Student will identify the various types of op-amp circuits from schematics. 47. Student will state the circuit parameters for op-amp circuits using mathematical formulas. 48. Student will demonstrate the operation of op-amp circuits using test equipment. 49. Student will verify the operation of selected op-amp circuits with given circuit parameters. 50. Student will analyze and trouble-shoot their own lab circuits using test equipment.	Operational amplifier circuits A. Discrete difference aplifiers B. Inverting op-amp C. Non-inverting op-amp D. Other instrument applications E. Power op-amps	Reading assignment Lecture Video tape presentation Lab experiments Group discussion Test

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Technical College

COURSE NUMBER 414-334

COURSE TITLE Analog Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
51. Student will identify the various types of voltage regulators and their associated current limiters from schematics. 52. Student will state the circuit parameters for voltage regulator circuits using mathematical formulas where applicable. 53. Student will demonstrate the operation and application of voltage regulator circuits. 54. Student will measure the parameters of voltage regulator circuits using test equipment. 55. Student will verify the operation of selected voltage regulator circuits with given circuit parameters. 56. Student will analyze and troubleshoot their own lab circuits using test equipment.	Analog/Linear voltage regulators A. Simple zener diode regulator B. Linear discrete voltage regulators C. Fixed voltage IC regulators D. Variable voltage IC regulators	Reading assignment Lecture Video tape presentation Lab experiments Group discussion Test

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Technical College

COURSE NUMBER 414-334

COURSE TITLE Analog Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
57. Student will identify the various types of transistor RF circuits from schematics. 58. Student will state the circuit parameters for transistor RF circuits using mathematical formulas. 59. Student will demonstrate the operation of transistor RF circuits. 60. Student will measure the parameters of RF transistor circuits using test equipment. 61. Student will verify the operation of selected RF transistor circuits with given circuit parameters. 62. Student will analyze and troubleshoot their own lab circuits using test equipment.	Radio Frequency Circuits 1. Local oscillators A. BJT B. JFET C. MOSFET D. Vacuum tube 2. Pre-amplifier Circuits A. BJT B. JFET C. MOSFET D. Vacuum tube 3. IF Amplifier Circuits A. BJT B. JFET C. MOSFET D. Vacuum tube	Reading assignment Lecture Video tape presentation Lab experiments Group discussion Test

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Telephone: (608) 756-4121

Serving Rock and Green Counties

COURSE NUMBER 414-336

COURSE TITLE: Digital Electronics

DIVISION: INDUSTRIAL OCCUPATIONS

PROGRAM ASSIGNMENT: AVIONICS

COREQUISITE: None

PREREQUISITE: Courses 414-332, 414-334

TEST OUT AVAILABLE : Yes

COURSE DESCRIPTION:
This course introduces the student to digital logic functions, truth tables, Boolean algebra, digital circuits and the application of digital circuits. The student begins by studying logic functions and expressing these functions with truth tables, theorems, and Boolean equations. Experimentation into digital gating, memory, counting, and arithmetic devices is introduced.

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Total potential hours of instruction	90
Classroom hours/week	2
Lab hours/week	3
Shop hours/week	—
Clinical or occupational hours/week	—
Field experience hours/week	
Total student hours/week	5
Length of course (weeks)	18

AID CODE: 32

MATERIAL CODE: 3 STATE APPROVAL DATE :

ORIGINAL PREPARED BY:
Gene Hilst, Electronics Instructor
Bill Stevens, Avionics Instructor

DATE: 173

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COURSE NUMBER 414-336

COURSE TITLE : Digital Electronics

TEXTS:

TITLE Digital Electronics EDITION First

AUTHOR Byron Putman PUBLISHER Prentice-Hall COPYRIGHT 1986

REFERENCES: Digital Systems - Principles and Applications, Fourth Edition
Ronald J. Tocci

EQUIPMENT AND SUPPLIES: Heathkit digital trainers, Nap digital trainers, protoboards, passive/active components, oscilloscope, power supply, DMM, logic probe and pulser, TTL compatible function generator, current probe.

AUDIO-VISUAL AIDS: See attached list

AUDIO VISUAL - LOGIC & DIGITAL CIRCUITS

1659V	Introduction to Digital Electronics	28 min
1660V	Introduction to Number Systems	28
1673V	Binary Number System (Bergwall)	20
1683V	Octal & BCD Codes (Bergwall)	20
352V	Voltage, Current, & Resistance (TI)	30
1661V	Bipolar Transistors and Switches	28
1662V	Basic Logic Gates	28
1674V	Logic AND/OR Gates (Bergwall)	20
1663V	TTL Integrated Circuits	28
1664V	CMOS and ECL Integrated Circuits	28
1665V	Combinational Logic Circuit Analysis	28
1676V	Boolean Algebra Fundamentals (Bergwall)	20
1666V	Basic Flip Flops	28
1678V	RS and Steered Flip Flops (Bergwall)	20
1679V	JK Flip Flops and Binary Counter (Bergwall)	20
1675V	Inverters, NAND and NOR Gates (Bergwall)	20
1667V	Counters	28
1680V	Up-Down Counter (Bergwall)	20
1682V	Shift Registers (Bergwall)	20
1668V	Shift Registers	28
1669V	Clock Circuits	28
1684V	BCD Counter (Bergwall)	20
1670V	Combinational Logic Circuit Applications	28
1681V	Decoding and Registers (Bergwall)	20
1671V	Exclusive OR and Exclusive NOR Gates	28
1677V	Exclusive OR Gates (Bergwall)	20
1672V	Testing Digital Circuits	28
1657V	Integrated Circuits	28

Hewlett Packard - Digital Troubleshooting

	Intro to Digital Electronics #1	12
	Binary Nature of Digital Circuits #2	18
1901V	Basic of Transistors & IC's #3	18
1907V	Logic Gates and Symbols #4	25
1902V	Intro to Digital IC Families #5	29
1720V	Modern Digital IC Families #6	27
1721V	Simple Trobleshooting Techniques #7	18
1514V	Troubleshooting Digital IC's #8	27

Program Titles

1 Introduction to Digital Electronics (#1659V)
2 Introduction to Number Systems (#1660V) .....

3 Binary Number System #850X-1 (#1673V)
4 Octal and BCD Codes #851X-4 (#1683V) .....

5 Voltage, Current, and Resistance (#352V)
6 Bipolar Transistors and Switches (#1661V) .....

7 Basic Logic Gates (#1662V)
8 Logic AND/OR Gates #850X-2 (#1674V) .....

9 TTL Integrated Circuits (#1663V)
10 CMOS and ECL Integrated Circuits (#1664V) .....

11 Combinational Logic Circuit Analysis (#1665V)
12 Boolean Algebra Fundamentals #850X-4 (#1676V)

13 Basic Flip/Flops (#1666V)
14 RS and Steered Flip/Flops #850X-6 (#1678V) ....

15 JK Flip/Flops and Binary Counter #850X-7 (#1679V)
16 Inverters, NAND and NOR Gates #850X-4 (#1675V)

17 Counters (#1667V)
18 Up-Down Counter #851X-1 (#1680V) .....

19 Shift Registers (#1682V)
20 Shift Registers #851X-1 (#1668V) .....

21 Clock Circuits (#1669V)
22 BCD Counter #851X-5 (#1684V) .....

23 Combinational Logic Circuit Applications (#1670V)
24 Decoding and Registers #851X-2 (#1681V) .....

25 Exclusive OR and Exclusive NOR Gates (#1671V)
26 Exclusive OR Gates #850X-5 (#1677V) .....

27 Testing Digital Circuits (#1672V)
28 Integrated Circuits (#1657V) .....

1482V	Flip Flops #9	31
1491V	Counters & Shift Registers #10	30
1722V	Combinational Logic Circuits #11	30
1723V	Display Technologies #12	30
	IC Manufacturing #13	11
1724V	Memories #14	25

Blackhawk
Technical College

COURSE NUMBER 414-336

COURSE TITLE Digital Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
1. Student will state the principles of digital logic and the binary number system.	Introduction to logic A. Binary numbers	Reading assignment Lecture - demonstration A/V presentation Group discussion Lab Test
2. Student will define and identify analog and digital signals and their differences.	Logic and analog signals	
3. Student will identify and describe number systems and codes.	Number systems: A. Binary B. Octal C. Hexidecimal D. Decimal E. Conversions F. Codes	

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Technical College

COURSE NUMBER 414-336

COURSE TITLE Digital Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
4. Student will state, write, identify, and simplify logic expressions using Boolean equations, identities and theorems.	Boolean equations, identities and theorems	Reading assignment Lecture - demonstration A/V presentation Group discussion Lab Test
5. Student will select and construct combinational logic circuits for areas of application for TTL and CMOS	Applications of combinational logic circuits	
6. Student will solve combinational logic problems and troubleshoot application circuits using test equipment	Applications of combinational logic circuits	

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Technical College

COURSE NUMBER 414-336

COURSE TITLE Digital Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
7. Student will define, identify, and select logic gates by component, circuit, functions, symbol and logic families.	Logic functions TTL and CMOS A. Inverter B. Or C. And D. Nor E. Nand F. Exclusive or and wor G. Combinational logic H. Troubleshooting logic levels	Reading assignment Lecture - demonstration A/V presentation Group discussion Lab Test
8. Student will construct, demonstrate and analyze logic gate circuits.	Same as above	Same as above
9. Student will operate test equipment to measure, troubleshoot and verify logic gate circuits, output levels of digital logic families and their functions	Same as above	Same as above

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Technical College

COURSE NUMBER 414-336

COURSE TITLE Digital Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
10. Student will define, identify, and select typical MSI devices	MSI devices: A. Comparator B. BCD to decimal decoder C. 3-line to 8-line decoder/ multiplexers D. LED seven segment display E. LCD seven segment display F. Encoders G. Data selector/multiplexers H. CMOS digitally controller analog switches I. 4 bit full adder	Reading assignment Lecture - demonstration A/V presentation Group discussion Lab Test
11. Student will construct, demonstrate and analyze MSI devices and circuits.	Same as above	Same as above
12. Student will operate test equipment to measure, trouble-shoot, and verify proper operation of MSI devices and circuits.	Same as above	Same as above

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Technical College

COURSE NUMBER 414-336

COURSE TITLE Digital Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
13. Student will define, identify, and select digital sequential operated devices.	Introduction to sequential devices: A. Feedback and digital circuits B. Clock and digital circuits C. Gated latches D. Clocks and transitions E. D flip-flop F. J-K flip-flop G. One-shot	Reading assignment Lecture - demonstration A/V presentation Group discussion Lab Test
14. Student will construct, demonstrate and analyze digital sequential devices and circuits.	Same as above	Same as above
15. Student will operate test equipment to measure, trouble-shoot and verify proper operation of sequential devices and circuits	Same as above	Same as above

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Technical College

COURSE NUMBER 414-336

COURSE TITLE Digital Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
19. Student will define, identify, and select three-state devices.	Three bus architecture A. Talkers and listeners B. Survey of three-state devices C. Bidirectional bus drivers D. The microprocessor: the master of the system buss	Reading assignment Lecture - demonstration A/V presentation Group discussion Lab Test
20. Student will construct, demonstrate, and analyze three-state devices and circuits.	Same as above	Same as above
21. Student will operate test equipment to measure, troubleshoot, and verify proper circuit operation.	Same as above	Same as above

Blackhawk
Technical College

COURSE NUMBER 414-336

COURSE TITLE Digital Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
16. Student will define, identify and select MSI counters and shift registers.	MSI counters and shift registers A. Modifying the count length B. MSI ripple counters C. Synchronous counter D. Up/down counters E. Shift registers	Reading assignment Lecture - demonstration A/V presentation Group discussion Lab Test
17. Student will construct, demonstrate, and analyze MSI counters and shift registers	Same as above	Same as above
18. Student will operate test equipment to measure, troubleshoot and verify proper circuit operation	Same as above	Same as above

Blackhawk
Technical College

COURSE NUMBER 414-336

COURSE TITLE Digital Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
22. Student will define, identify, and select IC memory devices, circuits and systems.	IC memory systems: A. 16 bit read/write memory B. Overview of memory devices C. Static RAMs D. Dynamic RAMs E. Read only memory F. Programmable logic devices	Reading assignment Lecture - demonstration A/V presentation Group discussion Lab Test
23. Student will construct, demonstrate, and analyze IC memory devices, circuits, and systems.	Same as above	Same as above
24. Student will operate test equipment to measure, trouble-shoot, and verify proper circuit and system operation.	Same as above	Same as above

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Technical College

COURSE NUMBER 414-336

COURSE TITLE Digital Electronics

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
25. Student will define, identify, and select data conversion devices, circuits, and systems.	Introduction to data conversion A. Schmitt trigger B. Data acquisition and control C. D-A converter D. A-D converter	Reading assignment Lecture - demonstration A/V presentation Group discussion Lab Test
26. Student will construct, demonstrate, and analyze data conversion circuits and systems.	Same as above	Same as above
27. Student will operate test equipment to measure, trouble-shoot, and verify proper circuit and system operation.	Same as above	Same as above

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Serving Rock and Green Counties

COURSE NUMBER 414-337

COURSE TITLE: Microcomputer Electronics

DIVISION: INDUSTRIAL OCCUPATIONS

PROGRAM ASSIGNMENT: AVIONICS

COREQUISITE:

PREREQUISITE: First semester courses

TEST OUT AVAILABLE : Yes

COURSE DESCRIPTION:

This course introduces the student to microprocessor and microcomputer circuits & systems. The student begins learning the hardware at the functional block and circuit levels, then progresses to the operation and manipulation of the system with machine level programming and on to high level language. Troubleshooting is then covered using symptom, section and component isolation. Fault tree analysis is used during the fault location process.

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Total potential hours of instruction	90
Classroom hours/week	2
Lab hours/week	3
Shop hours/week	—
Clinical or occupational hours/week	—
Field experience hours/week	—
Total student hours/week	5
Length of course (weeks)	18

AID CODE: 32

MATERIAL CODE: 3 STATE APPROVAL DATE :

ORIGINAL PREPARED BY:
Gene Hilst, Electronics Instructor
Bill Stevens, Avionics Instructor

DATE: 5-90

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Blackhawk
Technical College

COURSE NUMBER 414-337

COURSE TITLE Microcomputer Electronics

COMPETENCY STATEMENT 9	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will operate the microcomputer and use test equipment to measure and verify the proper operation of the unit.	Microcomputer hardware: A. Processor clock circuit B. Control signals C. Data bus D. Address bus E. Memory F. Registers and register parts G. Accumulator and logic circuits H. Arithmetic logic unit I. Processor function J. Random access memory K. Chip select circuitry L. Read only memory M. Keyboard input N. Display output O. Interrupt controller	Reading assignment Lecture presentation A/V presentation Group discussion Computer programming Lab experiments Test

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COURSE NUMBER 414-337

COURSE TITLE : Microcomputer Electronics

TEXTS:

TITLE Crash Course in Microcomputers EDITION Second

AUTHOR Louis Frenzel PUBLISHER Sams COPYRIGHT 1984

REFERENCES:
8085 Microprocessor Programming Course EE-8085
8085 Microprocessor Interfacing and Application EEJ-8085
Heathkit/Zenith
Digital Systems: Principles and Applications, Fourth Edition, Tocci
Prentice Hall, Inc., 1988
Microcomputer Theory and Servicing, First Edition
Asser, Stigliano, Bahrenburg, Merrill 1990

EQUIPMENT AND SUPPLIES:

Heathkit EWS - 8085, logic probe and pulser, current probe, diagnostic tools, signature analyzer, logic analyzer, oscilloscope, function generator, power supply, DMM's and component parts.

AUDIO-VISUAL AIDS: See attached list

AUDIO-VISUAL PRESENTATIONS

713V	Analog VS: Digital Systems	40 minutes
611V	Basic Training: Lesson 1	29 minutes
612V	Basic Training: Lesson 2	24 minutes
613V	Basic Training: Lesson 3	22 minutes
614V	Basic Training: Lesson 4	19 minutes
624V	Character I/O Devices	23 minutes
617V	Communicating with Your Computer	27 minutes
662V	Computer Applications	17 minutes
620V	Meet the Computer	17 minutes
838V	Operating Systems (New Lit.)	30 minutes
835V	Problem Solving and Program Design	30 minutes
830V	Processors (New Lit.)	30 minutes
715V	Processor Registers and Instruction Set	51 minutes
64V	Programming in Basics Pt. 1 (New Lit.)	30 minutes
1165V	Programming in Basics Pt. 2	30 minutes
1166V	Programming in Basics Pt. 3	30 minutes
1167V	Programming in Basics Pt. 4	30 minutes
836V	Programming Languages	30 minutes
826V	Putting Data In (New Lit.)	30 minutes
829V	Secondary Storage (New Lit.)	30 minutes
716V	Simple Assembly Programming (Undstg. Micro.)	41 minutes
627V	Speech, Music, and Graphics	21 minutes
828V	Storing Data (New Lit.)	30 minutes
712V	What is a Microprocessor? (undstg. Micros)	17 minutes
702V	Computer Hardware: What it Is & How It Works	50 minutes
703V	Computer Software: What it Is & How It Works	50 minutes
822V	Computing Machine, The Pt. 1 (New Lit.)	30 minutes
823V	Computing Machine, The Pt. 2 (New Lit.)	30 minutes
622V	CPU & Memory	17 minutes
621V	Inside the Computer	20 minutes
2017V	Learning DOS	45 minutes
2305V	Literate Society, A (New Lit.) Pt. 2	30 minutes
625V	Making Things Happen	17 minutes
623V	Mass Storage	23 minutes
714V	Introduction to Programming (Undstg. Micros)	19 minutes

Blackhawk
Technical College

COURSE NUMBER 414-337

COURSE TITLE Microcomputer Electronics

COMPETENCY STATEMENT 1	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify, define and select the operational parts of a microcomputer	Microcomputer Basics A. General block diagram B. Binary data C. Computer memories	Reading assignment Lecture presentation A/V presentation Group discussion Lab pre-orientation Test

Blackhawk
Technical College

COURSE NUMBER 414-337

COURSE TITLE Microcomputer Electronics

COMPETENCY STATEMENT 2	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify, define, and select the proper signal flow using a block diagram of a typical CPU	CPU architecture and operation A. 8080, 8085 and Z80 CPU's B. CPU's busses C. 16/32 bit CPU's	Reading assignment Lecture presentation A/V presentation Group discussion Lab pre-orientation Test

Blackhawk
Technical College

COURSE NUMBER 414-337

COURSE TITLE Microcomputer Electronics

COMPETENCY STATEMENT 3	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify, define, and select peripheral equipment for operational use.	Peripheral Equipment A. Input/out devices B. Auxiliary memory C. Mass store	Reading assignment Lecture presentation A/V presentation Group discussion Lab pre-orientation Test

Blackhawk
Technical College

COURSE NUMBER 414-337

COURSE TITLE Microcomputer Electronics

COMPETENCY STATEMENT 4	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify, define, and select the proper programming for operational use.	Programming A. Machine language B. Basic C. Other high languages D. PLC E. Real time software Aircraft microcomputer applications	Reading assignment Lecture presentation A/V presentation Group discussion Lab experiments Test

Blackhawk
Technical College

COURSE NUMBER 414-337

COURSE TITLE Microcomputer Electronics

COMPETENCY STATEMENT 5	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will program microcomputer for operational use.	Programming A. Machine language B. Basic C. Other high languages D. PLC E. Real time softward Aircraft microcomputer applications	Reading assignment Lecture presentation A/V presentation Group discussion Lab experiments Test

Blackhawk
Technical College

COURSE NUMBER 414-337

COURSE TITLE Microcomputer Electronics

COMPETENCY STATEMENT 6	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify, define, and select microcomputer hardware software for operational use	Programming A. Machine language B. Basic C. Other high languages D. PLC E. Real time softward Aircraft microcomputer applications	Reading assignment Lecture presentation A/V presentation Group discussion Lab experiments Test

Blackhawk
Technical College

COURSE NUMBER 414-337

COURSE TITLE Microcomputer Electronics

COMPETENCY STATEMENT 7	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify, define, select and configure the internal components of a microcomputer	Microcomputer hardware: A. Processor clock circuit B. Control signals C. Data bus D. Address bus E. Memory F. Registers and register parts G. Accumulator and logic circuits H. Arithmetic logic unit I. Processor function J. Random access memory K. Chip select circuitry L. Read only memory M. Keyboard input N. Display output O. Interrupt controller	Reading assignment Lecture presentation A/V presentation Group discussion Computer programming Lab experiments Test

Blackhawk
Technical College

COURSE NUMBER 414-337

COURSE TITLE Microcomputer Electronics

COMPETENCY STATEMENT 8	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will assemble, demonstrate, and analyze the internal components of a microcomputer by function using programming tools.	Microcomputer hardware: A. Processor clock circuit B. Control signals C. Data bus D. Address bus E. Memory F. Registers and register parts G. Accumulator and logic circuits H. Arithmetic logic unit I. Processor function J. Random access memory K. Chip select circuitry L. Read only memory M. Keyboard input N. Display output O. Interrupt controller	Reading assignment Lecture presentation A/V presentation Group discussion Computer programming Lab experiments Test

Blackhawk
Technical College

COURSE NUMBER 414-337

COURSE TITLE Microcomputer Electronics

COMPETENCY STATEMENT 10	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will use diagnostic tools and test equipment to troubleshoot malfunctions of the microcomputer system including subsystems, boards, modules, circuits and components in order to return unit to full operational status.	Microcomputer hardware: A. Processor clock circuit B. control signals C. Data bus D. Address bus E. Memory F. Registers and register parts G. Accumulator and logic circuits H. Arithmetic logic unit I. Processor function J. Random access memory K. Chip select circuitry L. Read only memory M. Keyboard input N. Display output O. Interrupt controller	Reading assignment Lecture presentation A/V presentation Group discussion Computer programming Lab experiments Test

BLACKHAWK
TECHNICAL COLLEGE
6004 Prairie Road
Janesville, Wisconsin 53547
Telephone: (608) 756-4121

COURSE NUMBER 414-337

COURSE TITLE : Microcomputer Electronics

TEXTS:

TITLE Crash Course in Microcomputers EDITION Second

AUTHOR Louis Frenzel PUBLISHER Sams COPYRIGHT 1984

REFERENCES:
8085 Microprocessor Programming Course EE-8085
8085 Microprocessor Interfacing and Application EEJ-8085
Heathkit/Zenith
Digital Systems: Principles and Applications, Fourth Edition, Tocci
Prentice Hall, Inc., 1988
Microcomputer Theory and Servicing, First Edition
Asser, Stigliano, Bahrenburg, Merrill 1990

EQUIPMENT AND SUPPLIES:

Heathkit EWS - 8085, logic probe and pulser, current probe, diagnostic tools, signature analyzer, logic analyzer, oscilloscope, function generator, power supply, DMM's and component parts.

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AUDIO-VISUAL AIDS: See attached list

223

713V	Analog VS: Digital Systems	40 minutes
611V	Basic Training: Lesson 1	29 minutes
612V	Basic Training: Lesson 2	24 minutes
613V	Basic Training: Lesson 3	22 minutes
614V	Basic Training: Lesson 4	19 minutes
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620V	Meet the Computer	17 minutes
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835V	Problem Solving and Program Design	30 minutes
830V	Processors (New Lit.)	30 minutes
715V	Processor Registers and Instruction Set	51 minutes
64V	Programming in Basics Pt. 1 (New Lit.)	30 minutes
1165V	Programming in Basics Pt. 2	30 minutes
1166V	Programming in Basics Pt. 3	30 minutes
1167V	Programming in Basics Pt. 4	30 minutes
836V	Programming Languages	30 minutes
826V	Putting Data In (New Lit.)	30 minutes
829V	Secondary Storage (New Lit.)	30 minutes
716V	Simple Assembly Programming (Undstg. Micro.)	41 minutes
627V	Speech, Music, and Graphics	21 minutes
828V	Storing Data (New Lit.)	30 minutes
712V	What is a Microprocessor? (undstg. Micros)	17 minutes
702V	Computer Hardware: What it Is & How It Works	50 minutes
703V	Computer Software: What it Is & How It Works	50 minutes
822V	Computing Machine, The Pt. 1 (New Lit.)	30 minutes
823V	Computing Machine, The Pt. 2 (New Lit.)	30 minutes
622V	CPU & Memory	17 minutes
621V	Inside the Computer	20 minutes
2017V	Learning DOS	45 minutes
2305V	Literate Society, A (New Lit.) Pt. 2	30 minutes
625V	Making Things Happen	17 minutes
623V	Mass Storage	23 minutes
714V	Introduction to Programming (Undstg. Micros)	19 minutes

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TECHNICAL COLLEGE
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Serving Rock and Green Counties

COURSE NUMBER 414-338

COURSE TITLE: Radio Communications

DIVISION: INDUSTRIAL OCCUPATIONS

PROGRAM ASSIGNMENT: AVIONICS

COREQUISITE:

PREREQUISITE: Completed First Semester

TEST OUT AVAILABLE: Yes

COURSE DESCRIPTION:

Experiments cover all aspects of basic RF communications theory. The course begins with basic AM and FM receivers and progresses to simple AM transceivers. Advanced topics include complex Single-Side-Band and Narrow-Band FM receiver and transmission system configurations. The students experiment with discrete and integrated communications circuits. In order to build troubleshooting skills, fault location is practiced.

227

Total potential hours of instruction	90
Classroom hours/week	2
Lab hours/week	3
Shop hours/week	—
Clinical or occupational hours/week	—
Field experience hours/week	—
Total student hours/week	5
Length of course (weeks)	18

AID CODE: 32

MATERIAL CODE: 3 STATE APPROVAL DATE:

ORIGINAL PREPARED BY:
Gene Hilst, Electronics Instructor

DATE: 6/90

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TECHNICAL COLLEGE
6004 Prairie Road
Janesville, Wisconsin 53547
Telephone: (608) 756-4121

COURSE NUMBER 414-338

COURSE TITLE : Radio Communications

TEXTS:
TITLE Electronic Communications EDITION Fifth

AUTHOR Shrader PUBLISHER McGraw-Hill COPYRIGHT 1985

REFERENCES:

Electronic Communication Systems, Third Edition
Kennedy; McGraw-Hill; 1985

Applied Electronic Communication Circuits, System and Transmission, First Edition
Kellejian; SRA; 1980

EQUIPMENT AND SUPPLIES: ECI communications trainers, lab volt training modules, power supplies, oscilloscope, function generator, frequency counter, DMM's, Q meter, capacitor analyzer, impedance bridge, spectrum analyzer, RTS kits, Bird wattmeter, impedance analyzer, RF probe, coax fittings and antenuators, antennas, RF dummy loads, signature analyzers, transistor curve tracer, Repair Station QN2R115L.

AUDIO-VISUAL AIDS: See attached list

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6004 Prairie Road
Janesville, Wisconsin 53547
Telephone: (608) 756-4121

COURSE NUMBER 414-338

COURSE TITLE : Radio Communications

TEXTS:

TITLE Communications Electronics EDITION First

AUTHOR Barken PUBLISHER Prentice-Hall COPYRIGHT 1987

REFERENCES:

Electronic Communication Systems, Third Edition
Kennedy; McGraw-Hill; 1985

Applied Electronic CommunicationCircuits, System and Transmission, First Edition
Kellejian; SRA; 1980

EQUIPMENT AND SUPPLIES: ECI communications trainers, lab volt training modules, power supplies, oscilloscope, function generator, frequency counter, DMM's, O meter, capacitor analyzer, impedance bridge, spectrum analyzer, RTS kits, Bird wattmeter, impedance analyzer, RF probe, coax fittings and antenuators, antennas, RF dummy loads, signature analyzers, transistor curve tracer, Repair Station QN2R115L.

AUDIO-VISUAL AIDS: See attached list

AUDIO VISUAL - COMMUNICATIONS

0110V	Frequency Modulation Part 1, Basic Principles		26 min.
0111V	High Frequency Wave Propagation		19 min.
0716F	Balanced Modulator & Crystal Filters		40 min.
0724F	High Frequency Operations		16 min.
0732F	Receiver Alignment		37 min.
0733F	Single Sideband Radio Introduction		19 min.
0968V	Low Frequency Amps (727F)		20 min.
0969V	Standing Waves on Transmission Lines (734F)		23 min.
0972V	Servicing Techniques (Transistor) (737F)		17 min.
1181V	Smith Charts	(HP)	29 min.
1182V	Transmission Lines	(HP)	15 min.
1182V	Sunspots	(NOVA)	60 min.
1483V	Amplitude Modulation	(HP)	16 min.
1484V	Introduction to PCM	(HP)	38 min.
1719V	Angular Modulation	(HP)	18 min.

RENTALS

Antenna Fundamentals - Propagation				
1963 color 16mm Purdue	#MP1907	$ 8.50	13 min.
Color TV				
1966 color 16mm U of Kan	#0-699-05732	$13.17	15 min.
Electromagnetic Waves; Part 2: Properties & Behavior				
1962 color 16mm Penn State	#20910	$14.50	21 min.
How Does Television Work				
1970 color 16mm Boston U	N/A	$ 9.95	10 min.
Introduction to Receivers				
1965 b/w 16mm NAVC	#002718/RL	$45.00	23 min.
Radio and Radar				
1963 b/w 16mm U of IL	#52252	$10.00	12 min.
Radio Antennas - Ground & Aircraft				
1968 b/w 16mm Purdue	#MP0601	$ 5.25	18 min.
Radio Transmitters - Basic Principles				
b/w 16mm Purdue	#MP3184	$ 5.75	32 min.
Television: Line by Line				
1970 color 16mm Penn State	#10808	$11.50	11 min.

Blackhawk
Technical College

COURSE NUMBER 414-338

COURSE TITLE Radio Communications

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will define and identify aircraft power supplies, audio amplifiers, and intercoms.	Communication Systems Power Supplies A. Ripple, regulation and output impedance B. Frequency response, bandwidth harmonic distortion C. Output impedance, input and load sensitivity	Reading assignment Lecture - demonstration Problem solving Group discussion Circuit tracing A/V presentation Lab experiments Test
Student will define and identify basic modulation systems	Basic Modulation Systems	

Blackhawk
Technical College

COURSE NUMBER 414-338

COURSE TITLE Radio Communications

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will define and identify AM receiver circuits and systems	AM recievers Superheterodyne RF Amplifiers Oscillator A. Range B. Tracking C. Stability	Reading assignment Lecture - demonstration Problem solving Group discussion Circuit tracing A/V presentation Lab experiments Test
Student will assemble AM circuits and receivers		
Student will measure AM circuit parameters using test equipment	IF amplifiers A. Gain B. Frequency response C. AM detectors D. AGC E. Receiver sensitivity F. Image frequency G. Adjacent channel rejection	
Student will troubleshoot and align AM receivers		

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Technical College

COURSE NUMBER 414-338

COURSE TITLE Radio Communications

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify and define AM transmitters Student will assemble simple low power AM transmitter circuits Student will measure AM transmitter circuit parameters and operating performance using proper test equipment Student will tune and trouble-shoot AM transmitters	AM Transmitters A. RF amplifier B. Oscillator C. AM transmitter modulation D. Buffer amplifiers E. Frequency multiplier stages F. Transmitter power stages	Reading assignment Lecture - demonstration Problem solving Group discussion Circuit tracing A/V presentation Lab experiments Test

Blackhawk
Technical College

COURSE NUMBER 414-338

COURSE TITLE Radio Communications

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify and define transmission lines and antennas Student will assemble, measure, and test transmission lines and antennas for proper operation	Transmission lines A. Characteristic impedance B. Wave phenomena C. Application Antennas A. Basic principles B. Propagation C. Radiation measurements D. Directional antennas E. Electrical parameters of antennas F. Dangers of radiation	Reading assignment Lecture - demonstration Problem solving Group discussion Circuit tracing A/V presentation Lab experiments Test

Blackhawk
Technical College

COURSE NUMBER 414-338

COURSE TITLE Radio Communications

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify and define communication systems noise	Noise terminology and basic concepts	Reading assignment Lecture - demonstration Problem solving Group discussion Circuit tracing A/V presentation Lab experiments Test
Student will locate and measure parameters and sources of noise in avionic systems	Signal-to-noise ration	
	Noise figure	
	Noise and receiver	
Student will use test equipment to troubleshoot, eliminate and repair noise problem as experienced in aircraft systems	Automatic gain control circuits	
	Noise and information	
	Transmission	

Blackhawk
Technical College

COURSE NUMBER 414-338

COURSE TITLE Radio Communications

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify and define FM communication systems Student will assemble simple low power FM transmitter circuits Student will measure FM transmitter circuit parameters and operating performance using proper test equipment Student will align and trouble-shoot FM transmitters	Principles of angle modulation FM transmitter systems	Reading assignment Lecture - discussion Problem solving Group discussion Circuit tracing A/V presentation Lab experiments Test

Blackhawk
Technical College

COURSE NUMBER 414-338

COURSE TITLE Radio Communications

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify and define FM receivers Student will assemble FM circuits and receivers Student will measure FM circuit parameters using test equipment Student will troubleshoot and align FM receivers	FM Receivers A. Detector B. Noise C. Image D. Sensitivity	Reading Assignment Lecture - discussion Problem solving Group discussion Circuit tracing A/V presentation Lab experiments Test

Blackhawk
Technical College

COURSE NUMBER 414-338

COURSE TITLE Radio Communications

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify and define two-way radio systems Student will assemble and demonstrate two-way communication systems Student will use test equipment to measure, troubleshoot, and repair two-way communication systems	Two-way radio A. Basic concepts B. Narrowband FM radiotelephone transceiver C. AM transceivers D. Frequency synthesis E. Single-sideband transmission F. SSB radiotelephone system G. Transceiver instrumentation H. Microphones, loudspeakers; and headphones I. Servicing radiotelephone equipment J. Microprocessor controlled transceivers K. Squelch systems	Reading assignment Lecture - discussion Problem solving Group discussion Circuit tracing A/V presentation Lab experiments Test

Blackhawk
Technical College

COURSE NUMBER 414-338

COURSE TITLE Radio Communications

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify and define digital communications systems Student will assemble and demonstrate digital communication systems Student will use test equipment to measure, troubleshoot, and repair digital communications systems	Digital Communication System A. Sampling B. Quantization and coding C. Decoding D. Satellite communication systems	Reading assignment Lecture - discussion Problem solving Group discussion Circuit tracing A/V presentation Lab experiments Test

BLACKHAWK
TECHNICAL COLLEGE
6004 Prairie Road
Janesville, Wisconsin 53547
Telephone: (608) 756-4121

Serving Rock and Green Counties

COURSE NUMBER 414-339

COURSE TITLE: Aircraft Electromechanical Components & Control Systems

DIVISION: INDUSTRIAL OCCUPATIONS

PROGRAM ASSIGNMENT: AVIONICS

COREQUISITE:
PREREQUISITE: First Semester Courses

TEST OUT AVAILABLE : Yes

COURSE DESCRIPTION:

This course applies core fundamentals to rotating machinery, synchro/servo mechanisms, and transducer components and circuits. The student begins with motors and continues learning the circuits that control these devices. Transducer components and circuits are taught because of common integration with electromechanical systems used in fly by wire aircraft. Troubleshooting is covered with each topic in this course.

252

Total potential hours of instruction	90
Classroom hours/week	2
Lab hours/week	3
Shop hours/week	—
Clinical or occupational hours/week	—
Field experience hours/week	—
Total student hours/week	5
Length of course (weeks)	18

AID CODE: 32

MATERIAL CODE: 3 STATE APPROVAL DATE :

ORIGINAL PREPARED BY:

Gene Hilst, Electronics Instructor
Bill Stevens, Avionics Instructor

DATE: 6/90

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BLACKHAWK
TECHNICAL COLLEGE
6004 Prairie Road
Janesville, Wisconsin 53547
Telephone: (608) 756-4121

COURSE NUMBER 414-339

COURSE TITLE : Aircraft Electromechanical Components & Control Systems

TEXTS:

TITLE NIDA Series 130 Units V, VI, VII EDITION 1

AUTHOR Technical Staff PUBLISHER NIDA Corp. COPYRIGHT 1988

REFERENCES: Various aircraft manuals

AUDIO-VISUAL AIDS: See attached list

EQUIPMENT AND SUPPLIES: NIDA Series 130 CRI electromechanical training system, aircraft electrical system components, aircraft electrical test systems, DMM, oscilloscope, temperature probes, vacuum pump function generator, frequency counter, AC-DC current clamp-on current probe, electronic tachometer, insulation tester, and aircraft system manual.

AUDIO-VISUAL PRESENTATIONS

386V	R & M Electro-craft Servo System	97 minutes
1313V	Principles of Technology Transducers	42 minutes
2643V	Principles of Process & Servo Controls Servo Feedback Analysis	52 minutes
086V	Couplings (Basic Electricity)	20 minutes
1565V	DC Generators	22 minutes
1559V	DC Motor Principles	38 minutes
1560V	DC Motors Mechanical Overhaul	20 minutes
1561V	DC Motors Motors & Generators	
1562V	DC Motors Rewinding	37 minutes
1564V	Direct Current Generator: Theory of Operation	13 minutes
1566V	Direct Current Motors: Theory of Operation	10 minutes
1569V	Rotating Magnetic Fields	13 minutes
082V	Motors Pt. 1 (Basic Electricity)	22 minutes
083V	Motors Pt. 2 (Basic Electricity)	23 minutes
977V	Motors & Generators AC	22 minutes
978V	Motors & Generators DC	17 minutes
1923V	Sensors MI # 16	30 minutes
1573V	Squirrel Cage Rotor Principles	10 minutes
1574V	Synchro Systems Pt. 1	15 minutes
2676B	Synchro Systems Pt. 2	13 minutes

Blackhawk
Technical College

COURSE NUMBER 414-339

COURSE TITLE Aircraft Electromechanical Components & Control Systems

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify and define the different types of synchro/servo systems and the principles by which they operate and their applications to aircraft electrical and control systems. Student will select, install, assemble, and connect power to synchro/servo systems and demonstrate the normal operation of all the various types as they exist in aircraft systems. Student will select the proper test equipment and measure the normal operating parameters of synchro/servo systems. Student will use test equipment to analyze, troubleshoot, and repair synchro/servo test bench and aircraft systems according to FAA regulations.	Synchro/servo Systems A. Synchro stator voltages B. Electrical and mechanical zero C. Synchro operation D. Synchro positioning circuits and systems E. Resolver positioning circuits and systems F. Closed loop servo circuits and systems G. Aircraft control systems	Reading assignment Lecture - demonstration A/V presentation Lab experiments Test

Blackhawk
Technical College

COURSE NUMBER 414-339

COURSE TITLE Aircraft Electromechanical Components & Control Systems

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify and define the different types of rotating machinery and the principles by which they operate and their applications to aircraft electrical and control systems. Student will select, install, assemble, and connect power to rotating machinery and demonstrate the normal operation of all the various types as they exist in aircraft systems. Student will select the proper test equipment and measure the normal operating parameters of rotating machinery. Student will use test equipment to analyze, troubleshoot, and repair rotating machinery according to FAA regulations.	Rotating Machinery A. DC shunt, Series S and compound motors. B. Time control of DC motors C. Amplitude control of DC motors D. AC motor characteristics E. Stepper motors and controllers F. Motor-generator action G. Aircraft electrical systems	Reading assignment Lecture - demonstration A/V presentation Lab experiments Test

Blackhawk
Technical College

COURSE NUMBER 414-339

COURSE TITLE Aircraft Electromechanical Components & Control Systems

COMPETENCY STATEMENT	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will identify and define the different types of transducers and the principles by which they operate and their applications to aircraft control systems. Student will select, install, assemble, and cable transducers and demonstrate the normal operation of all the various types as they exist in aircraft systems. Student will select the proper test equipment and measure the normal operating parameters of transducers. Student will use test equipment to analyze, troubleshoot, and repair or replace aircraft control transducer according to FAA regulations.	Transducers A. Photoelectric transducers B. Temperature transducers C. Motion and position detection D. Digital to analog conversion E. Analog to digital conversion F. Pulse modulation G. Time division multiplexing H. Aircraft control transducer components	Reading assignment Lecture - demonstration A/V presentation Lab experiments Test

BLACKHAWK
TECHNICAL COLLEGE
6004 Prairie Road
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Telephone: (608) 756-4121

Serving Rock and Green Counties

COURSE NUMBER 414-400

COURSE TITLE: FCC License Preparation

DIVISION: INDUSTRIAL OCCUPATIONS

PROGRAM ASSIGNMENT:

COREQUISITE:

TEST OUT AVAILABLE :

COURSE DESCRIPTION:
Students study and learn the necessary elements to prepare and pass the federal requirements to obtain a general FCC radio and telephone license which is a requirement for aviation radio services.

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Total potential hours of instruction	30
Classroom hours/week	2
Lab hours/week	—
Shop hours/week	—
Clinical or occupational hours/week	—
Field experience hours/week	—
Total student hours/week	2
Length of course (weeks)	15

AID CODE: 32

MATERIAL CODE: 88 STATE APPROVAL DATE :

ORIGINAL PREPARED BY:
Gene Hilst, Electronics Instructor
Bill Stevens, Avionics Instructor

DATE: 6/90

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BLACKHAWK
TECHNICAL COLLEGE
6004 Prairie Road
Janesville, Wisconsin 53547
Telephone: (608) 756-4121

COURSE NUMBER 414-400

COURSE TITLE : FCC License Preparation

TEXTS:
TITLE FCC Home-Study Guide EDITION _____

AUTHOR USN - W. Weagant PUBLISHER Command Prod. COPYRIGHT 1989

REFERENCES: FCC License Preparation, WPT Publications
Electronic Communications, Fifth Edition, Shrader, McGraw-Hill 1985

AUDIO-VISUAL AIDS: FCC License Home Study Course - audio tapes
WPT FCC License Preparation - video tapes

EQUIPMENT AND SUPPLIES: Overhead projector
VHS - VCR
Casette tape recorder

Blackhawk
Technical College

COURSE NUMBER 414-400

COURSE TITLE FCC License Preparation

COMPETENCY STATEMENT # 1	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will define, select, identify, state and calculate solutions to electronic questions and problems as presented on the FCC General Telephone Examination	Matter, Energy and Electricity Batteries Direct Current Concepts of Alternating Current Inductance Capacitance Inductive and Capacitive Reactance Transformers Basic Test Equipment Characteristics of Matter and Energy PN Junction Power Supplies Transistors Electron Tubes Voltage Regulators & Meters Fundamentals of Communications Theory Tuner Circuits Introduction to Receivers Detectors Audio Amplifiers & RF Amplifiers Oscillators Mixers and Converters IF Amplifiers Receiver Control Circuits Receiver Alignment Introduction to Transmitters RF Power Amplifiers Amplitude Modulation Frequency Modulation Installation - Trouble Shooting Single Sideband CW & FM Reception Six-Step Trouble Shooting Transmission Lines	

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Technical College

COURSE NUMBER 414-400

COURSE TITLE FCC License Preparation

COMPETENCY STATEMENT # 1	CONTENT OUTLINE	LEARNING ACTIVITIES
	Antennas UHF - Microwave Motors and Generators Tolerances, Identification Rules and Regulations Test Taking Skills Final Exam - Passing the FCC Exam	Reading Assignments Written Assignments Video Tape Presentations Audio Tape Presentations Practice Examinations

Blackhawk
Technical College

COURSE NUMBER 414-400

COURSE TITLE FCC License Preparation

COMPETENCY STATEMENT # 2	CONTENT OUTLINE	LEARNING ACTIVITIES
Student will demonstrate the necessary skills to successfully pass the FCC general telephone examination.	Matter, Energy and Electricity Batteries Direct Current Concepts of Alternating Current Inductance Capacitance Inductive and Capacitive Reactance Transformers Basic Test Equipment Characteristics of Matter and Energy PN Junction Power Supplies Transistors Electron Tubes Voltage Regulators and Meters Fundamentals of Communications Theory Tuner Circuits Introduction to Receivers Detectors Audio Amplifiers RF Amplifiers Oscillators Mixers and Converters IF Amplifiers Receiver Control Circuits Receiver Alignment Introduction to Transmitters RF Power Amplifiers Amplitude Modulation Frequency Modulation Installation - Trouble Shooting Single Sideband CW and FM Reception Six-Step Trouble Shooting Transmission Lines	

Blackhawk
Technical College

COURSE NUMBER 414-400

COURSE TITLE FCC License Preparation

COMPETENCY STATEMENT # 2	CONTENT OUTLINE	LEARNING ACTIVITIES
	Antennas UHF - Microwave Motors and Generators Tolerances, Identification Rules and Regulations Test Taking Skills Final Exam - Passing the FCC Exam	Reading Assignments Written Assignments Video Tape Presentation Audio Tape Presentation Practice Examinations